AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for determining if a test compound induces uracil misincorporation into DNA of cells by inhibiting thymidylate metabolism, the method comprising:

a) providing aliquots of four cell types ~~the following cells~~:

i) wildtype cells;

ii) cells overexpressing dUTPase;

iii) cells overexpressing a uracil-DNA glycosylase; and

iv) cells expressing a ~~the~~ uracil-DNA glycosylase inhibitor protein Ugi or cells possessing a compromised uracil-DNA glycosylase function;

b) exposing each of the cells to the test compound;

~~b) exposing the cells to an agent that directly or indirectly inhibits thymidylate metabolism, in the presence or absence of the test compound;~~

c) measuring ~~one or more features of~~ the ~~exposed~~ cells~~, the features comprising~~ for dUTP levels in the cells, for the amount of uracil present in DNA of the cells, and optionally for cell cycle checkpoint arrest;

~~i) cell growth or viability;~~

~~ii) cell cycle checkpoint arrest;~~

~~iii) presence of replication intermediates in the cells;~~

~~iv) amount of dUTP present in the cells; and~~

~~v) presence or amount of uracil in DNA of the cells;~~

d) interpreting the measurements ~~measured features~~, wherein a profile in the four cell types that ~~which~~ is indicative that the test compound induces uracil misincorporation into DNA comprises ~~one or more~~ the measurements ~~features~~ of ~~in each of the cell types comprising~~:

i) in the wildtype cells, ~~cytotoxicity, cell cycle arrest at G1/S or early S-phase, presence of replication intermediates,~~ elevated dUTP pools, ~~or~~ little or no detectable uracil in the DNA, and optionally cell cycle arrest at G1/S or early S phase;

ii) in the dUTPase overexpressing cells, ~~enhanced resistance to cytotoxicity, cell cycle arrest at mid S-phase, presence of replication intermediates,~~ low dUTP pools, ~~or~~ little to no detectable uracil in DNA, and optionally cell cycle arrest at mid S-phase;

iii) in the uracil-DNA glycosylase overexpressing cells, ~~cytotoxicity or enhanced cytotoxicity, cell cycle arrest at G1/S or early S-phase, presence of replication intermediates,~~ elevated dUTP pools, ~~or~~ little to no detectable uracil in DNA, and optionally cell cycle arrest at G1/S or early S-phase; and

iv) in the nonfunctional or compromised uracil-DNA glycosylase cells, ~~enhanced resistance to cytotoxicity, cell cycle arrest at G2/M phase, reduced presence of replication intermediates,~~ elevated dUTP pools, ~~or~~ stable uracil incorporation into DNA, and optionally cell cycle arrest at G2/M phase.

2. (Original) The method of claim 1, wherein the cells are of an organism selected from the group consisting of yeast, *D. melanogaster*, and *C. elegans*.

3. (Currently Amended) The method of claim 2, wherein the cells are yeast cells ~~and the conversion of dUMP to TMP is inhibited by an antifolate~~.

4. (Cancelled)

5. (Currently Amended) The method of claim 1, wherein the cells overexpressing ~~a~~ dUTPase are from an organism selected from the group consisting of humans, animals, plants, fungi, algae, protozoa, bacteria and viruses.

6. (Currently Amended) The method of claim 1, wherein the cells overexpressing ~~a~~ uracil-DNA glycosylase are from an organism selected from the group consisting of humans, animals, plants, fungi, algae, protozoa, bacteria and viruses.

7. (Currently Amended) The method of claim 1, wherein the cells lacking a uracil-DNA glycosylase function are created ~~produced~~ by producing in the cells an inhibitor of uracil-DNA glycosylase.

8. (Previously Amended) The method of claim 1, wherein the inhibitor of uracil-DNA glycosylase is obtained from a virus.

9-12. (Cancelled)

13. (New) The method of claim 1, wherein step c) further comprises optionally measuring the feature of cell growth or viability; and wherein step d) interpretation further comprises:

i) in the wildtype cells, cytotoxicity;

ii) in the dUTPase overexpressing cells, enhanced resistance to cytotoxicity;

iii) in the uracil-DNA glycosylase overexpressing cells, cytotoxicity; and

iv) in the nonfunctional or compromised uracil-DNA glycosylase cells, enhanced resistance to cytotoxicity.

14. (New) The method of claim 1, wherein the test compound comprises a single substance.

15. (New) The method of claim 1, wherein the test compound comprises two or more substances.

16. (New) The method of claim 1, wherein the test compound is a dUTPase inhibitor or an antifolate agent.

17. (New) The method of claim 1, wherein the test compound is a chemotherapeutic test compound.

18. (New) The method of claim 1, wherein the cells are from the same species.

19. (New) The method of claim 1, wherein the cells are human cells.

20. (New) The method of claim 1, wherein the method is used to screen compounds for the treatment of a human disease.

21. (New) The method of claim 20, wherein the human disease is cancer.

22. (New) A method for determining if a chemotherapeutic test compound induces uracil misincorporation into DNA of cells by inhibiting thymidylate metabolism, the method comprising:

a) providing aliquots of four cell types:

i) wildtype cells;

ii) cells overexpressing dUTPase;

iii) cells overexpressing a uracil-DNA glycosylase; and

iv) cells expressing the uracil-DNA glycosylase inhibitor protein Ugi or cells possessing a compromised uracil-DNA glycosylase function;

b) exposing each of the cells to the test compound;

c) measuring the cells for dUTP levels in the cells, for the amount of uracil present in DNA of the cells, and optionally for cell cycle checkpoint arrest;

d) interpreting the measurements, wherein a profile in the four cell types that is indicative that the test compound induces uracil misincorporation into DNA comprises one or more measurements of:

i) in the wildtype cells, elevated dUTP pools, little or no detectable uracil in the DNA, or cell cycle arrest at G1/S or early S phase;

ii) in the dUTPase overexpressing cells, low dUTP pools, little to no detectable uracil in DNA, or cell cycle arrest at mid S-phase;

iii) in the uracil-DNA glycosylase overexpressing cells, elevated dUTP pools, little to no detectable uracil in DNA, or cell cycle arrest at G1/S or early S-phase; and

iv) in the nonfunctional or compromised uracil-DNA glycosylase cells, elevated dUTP pools, or stable uracil incorporation into DNA, or cell cycle arrest at G2/M phase.

23. (New) The method of claim 22, wherein step c) further comprises optionally measuring the feature of cell growth or viability; and wherein step d) interpretation further comprises:

i) in the wildtype cells, cytotoxicity;

ii) in the dUTPase overexpressing cells, enhanced resistance to cytotoxicity;

iii) in the uracil-DNA glycosylase overexpressing cells, cytotoxicity; and

iv) in the nonfunctional or compromised uracil-DNA glycosylase cells, enhanced resistance to cytotoxicity.

24. (New) The method of claim 22, wherein the cells are human cells and the method is used to screen compounds for the treatment of a human disease.

25. (New) The method of claim 24, wherein the human disease is cancer.